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Abnormal Angulations of the Colon as a Cause of Serious Intestinal Disturbance.

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Reprinted from
The International Journal of Surgery
December, 1913.



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A. Judson Quimby, M. D.

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In presenting a subject of such vital importance for your consideration my viewpoint as a radiologist alone will be given, and the deductions made from the findings as observed after careful examination of over five hundred cases by the fluoro-

in operative interference must be borne in mind when analyzing the symptom-complex that may be presented to the pediatrician. Ptosis is present in early life, developing soon after the child walks; its effect is made manifest by a chronic state of



Fig. 1. Miss E. B., age eight years, referred by Dr. Victor E. Sorapure. *I.* Ileum. *Ap.* Appendix. *C.* Cecum. *A. C.* Ascending colon. This is taken eight hours after the administration of the meal, when the head of the bismuth column has ascended to a point near the hepatic flexure. It remained almost stationary at this place.

scope and radiograph will cover conditions found in the ensuing description of the many mechanical and pathological lesions occurring in the large intestine.*

That these anomalous conditions develop very early in life and produce lesions of sufficient seriousness to annoy the patient and probably end



Fig. 2. Same case as Fig. 1. At the sixty-hour period. During this prolonged delay there has been a slow discharge of the contents of the ascending colon into the transverse. A small portion has been evacuated, while there is a distribution from the hepatic flexure to the rectum, with a persistently large residue in the cecum and ascending colon. The delay in this case is due to an angulation in the first portion of the transverse colon, due to adhesions. There was difficulty in controlling the patient; therefore the exact character of the adhesions could not be determined.

constipation, gradual development of a pendulous abdomen almost constantly distended with gas, flattening of the chest and drop of the shoulders, and its existence is proved by the evidence of the bismuth meal and x-ray examination.

It has been proven that a contracted mesentery,

* For my observations on mechanical stasis in the upper intestinal tract see *American Medicine*, April, 1913.

bands and adhesions exist in the new born; to explain this would require a prolonged discussion of the effect of inheritance and of evolutionary development which is prone to occur in any race that has formed habits which are practiced in many generations. It should be sufficient to state here that when the human race assumed the erect position, the intestines hung downward to be supported by the pelvis and its floor instead of the anterior abdominal wall. Undue traction was placed on the mesentery, and this being unequal at all points caused the development of evolutionary bands,



Fig. 3. Miss J. W., age six years, referred by Dr. T. W. Harvey. *Ap.* Appendix. *C.* Cecum. *A. C.* Ascending colon. *H. F.* Hepatic flexure. *T. C.* Transverse colon. *An.* Angulation. *S. F.* Splenic flexure. *D. C.* Descending colon. *Sg.* Sigmoid. *R.* Rectum. The constriction in the ascending colon was due to adhesions or bands. Angulation of the left transverse colon was of the static type. The constriction at the juncture of the iliac and pelvic sigmoid is due to a contracted mesentery at the pelvic brim.

contracted mesentery, and adhesions, which, repeated generation after generation, has resulted in the inheritance of these anomalies. All children are not born with adhesions, bands, etc., and it cannot be positively stated that cases in which we found these conditions were not born with them or that they at least had a beginning formation which has become intensified as the child grew older. We may say that some children are born without any modifications within the mesentery or bowel, and that they come into the world as free



Fig. 4. Mrs. K., referred by Dr. George Schaub. *C.* Cecum. *A. C.* Ascending colon. *Cn.* Constriction. *H. F.* Hepatic flexure. *S. F.* Splenic flexure. A constriction in the ascending colon is due to a mesenteric band. This is not obstructive except when the patient is erect, with the hepatic flexure sagging forward and downward.

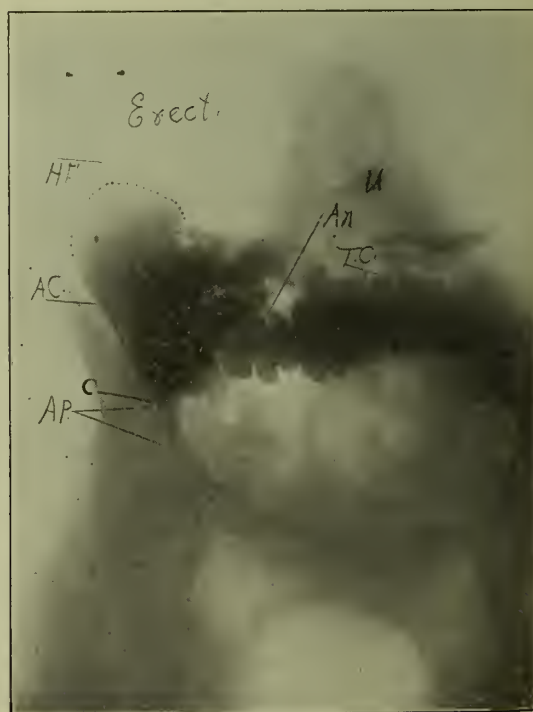


Fig. 5. Miss M., referred by Dr. E. L. Kellogg. *C.* Cecum. *A. C.* Ascending colon. *H. F.* Hepatic flexure. *T. C.* Transverse colon. *An.* Angulation. This angulation in the right transverse colon is due to a band having formed along the upper border of the colon and contracted, drawing it together.

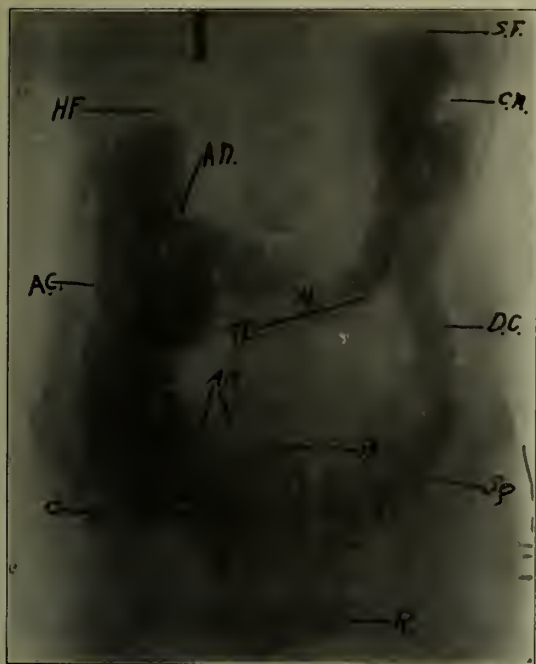


Fig. 6. Mrs. S., referred by Dr. Runyon. C. Cecum. A. C. Ascending colon. H. F. Hepatic flexure. T. C. Transverse colon. An. Angulation. U. Umbilicus. The angulation in the right transverse colon is of the static type, and can be corrected by manipulation. See plate 7.



Fig. 7. Same case as Fig. 6. In this the angulation in the right transverse colon has been corrected by displacing this portion of the colon upward. This case had an unusually long transverse meso-colon, which permitted the colon to drop to the pelvis when the patient was erect.

of these conditions as a new born quadruped. Others are born with adhesions, bands, and contracted mesentery. Of the first class, some living under favorable surroundings and a natural healthy life, proper diet and exercise, go on to maturity without any intestinal interference. Others are placed in unfavorable surroundings and fed on deleterious food; constipation is produced with the result that the bowel is overloaded and the abdomen is distended and relaxed; ptosis is

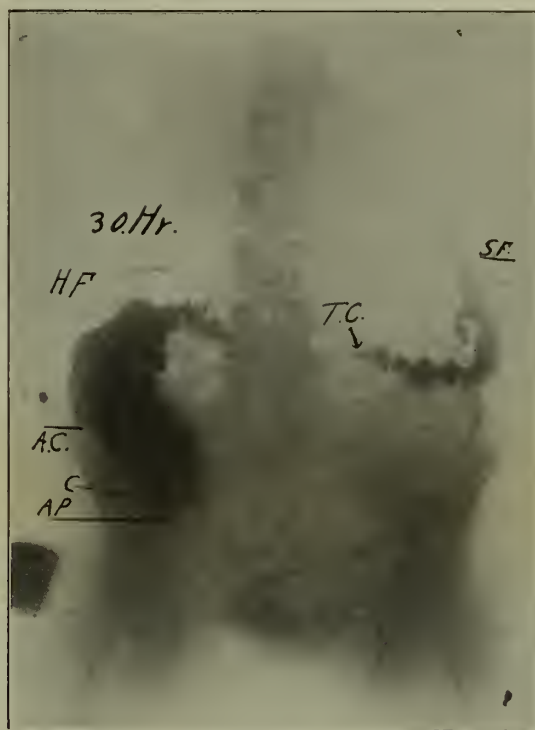


Fig. 8. Mrs. McL., referred by Dr. Wm. B. Graves. Ap. Appendix. C. Cecum. A. C. Ascending colon. H. F. Hepatic flexure. T. C. Transverse colon. This plate was taken 30 hours after a bismuth meal. This illustrates a loaded cecum and ascending colon, slowly feeding the remainder of the colon with its contents, when there is an incomplete constriction which may result from the described conditions.

established and undue traction of the intestinal supports occurs, and the evolutionary process is started by round-cell infiltration where the greatest strain comes on the mesentery. Connective tissue forms which contracts, pulling upward to a greater degree than previously, and we have a vicious circle established consisting of further constipation, overloading and distention, more traction, round-cell infiltrations and connective tissue production. Radiographs No. 1 and No. 2 are two which illustrate how early in life we may have pronounced evil results from angulations of the colon. In the first one will be seen a large collection of

bismuth in the cecum and first portion of the ascending colon; there then comes an abrupt decrease in the caliber of the bowel as made manifest by the shadow of the bismuth, and from this point onward it is distributed in small fragments, consisting of such as may have been forced past the



Fig. 9. Miss H., referred by Dr. Victor E. Sorapure. C. Cecum. A.C. Ascending colon. Ch. Constriction. H. F. Hepatic flexure. T. C. Transverse colon. Sg. Sigmoid. S. F. Splenic flexure. S. Stomach. D. C. Descending colon. A constriction will be observed on the ascending colon close to the hepatic flexure. See Fig. 10.

obstruction by peristalsis originating in the cecum and carried upward to this point. In the second radiograph an enema was administered which distended the colon up to the point of angulation, so locating it and enabling us to make a diagnosis. The patient is suffering from a chronic appendix which is kinked and an iliac stasis, the result of backward pressure from the loaded colon.

As the initial stasis in the cecum and ascending colon which first established dilation must have occurred in early life, the original mechanical factors which caused the delay must be studied to enable us to bring forward the factors that are maintaining the condition in the adult. In a large percentage of patients the ascending mesocolon is short while the support of the transverse colon is long and permits it to drop forward when in the erect position.

Should the transverse colon become sufficiently filled with fecal matter, adding enough weight to drag heavily on the mesocolon near the hepatic

flexure, the increased tension on the highest segment of the mesocolon, which bears the weight of the ascending and first half of the transverse colon, begins. The effect of this prolonged strain is the gradual production of new-formed connective tissue within the mesocolon. As evolutionary processes go on in the child and adult and intestinal stasis is more firmly established and the weight becomes greater, an acute angle is formed at the point where the traction of the mesentery occurs.

Our normal conception of the hepatic flexure is that of a curve of the colon which arches over and slightly drops to become continuous with the reversed curve of the transverse colon as it passes upward to the higher splenic flexure; this is the normal or anatomical type which is seen in the individual without a marked ptosis and especially where there is sufficient fat to support

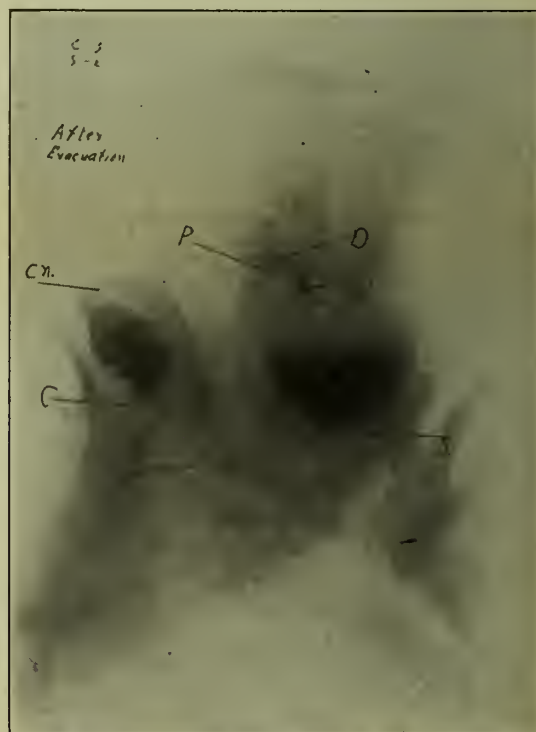


Fig. 10. Same case as No. 9. Taken with the patient erect, immediately following the evacuation of the enema. This readily demonstrates how following the discharge of the enema, we still have a collection in the cecum and the first portion of the ascending colon, while that remaining in the transverse and descending colon is but the small remnants that have clung to the wall of the bowel. Peristalsis has been initiated just above the constriction, and carried forward from this point to the rectum.

abdominal structures when the abdomen is not pendulous below the umbilicus. In some patients a short transverse mesocolon will maintain the organ in such a position as to form a normal hepatic curve.

When the cecum and ascending colon are dilated

and drag downward and the transverse colon is ptosed, the hepatic curve becomes an angle, or if the mesocolon of the hepatic flexure is longer than that of the ascending colon just below that of the hepatic curve, an angle will be established at the highest point of the short mesocolon. This will result in a pronounced interference at this point in the rapidity with which the intestinal contents are moved by peristalsis. Efforts that the colon may take to overcome this obstruction tend to stretch the intestinal walls and produce vascular and nutritional changes within them; this, combined with the traction obstructing circulation, etc., brings about a mild inflammatory reaction with the formation of new membranes and bands,

tration and the resulting connective tissue binding the parts together, changes of less degree occur in the muscular coat and interfere with its power of contraction. On the flexure side of the curve the muscle fibers decrease in length and atrophy, while on the convex side they may become stretched

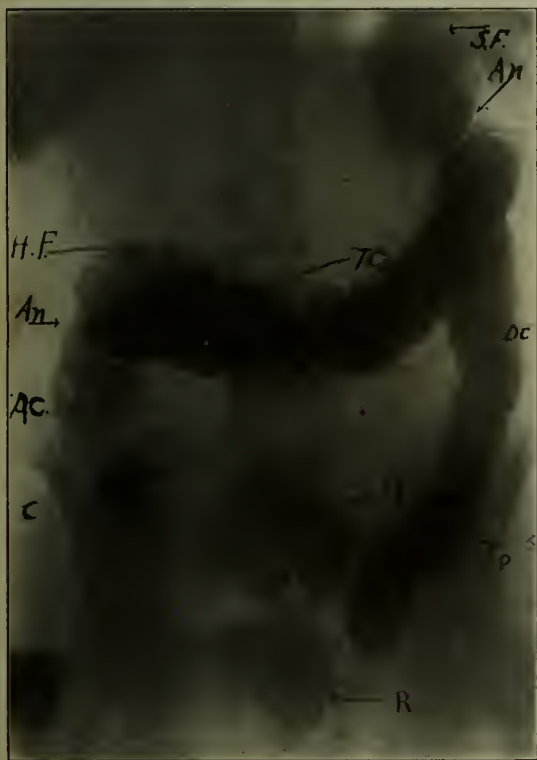


Fig. 11. Mrs. I., referred by Dr. Edward L. Kellogg. C. Cecum. A. C. Ascending colon. An. Angulation. H. F. Hepatic flexure. D. C. Descending colon. Sg. Sigmoid. In this colon there are three angulations. The one in the ascending portion is due to a contracted mesentery just below the hepatic flexure. The one at the splenic flexure includes some band-like formation. That in the sigmoid is the result of contracted mesentery. It will be noticed that the resistance of the one at the hepatic flexure is sufficient to prevent the enema from passing freely into the ascending colon; therefore this portion is not distended.

which generally spread over the two arms of the flexure and result in agglutination of their contiguous surfaces, or may bridge across from one to the other and continue on to the viscera or the abdominal wall. When reaction to this constant irritation is insufficient to cause round-cell infil-



Fig. 12. Mrs. McC., referred by Dr. Orrin S. Wightman. I. Ileum. Ap. Appendix. C. Cecum. A. C. Ascending colon. Cn. Constriction. H. F. Hepatic flexure. S. F. Splenic flexure. In this there are four constrictions. The one in the ascending colon is not very pronounced when the horizontal position. When the patient stands up and the hepatic flexure drops forward the angle becomes very acute. In this case there is no pronounced organic change except a contracted mesentery. The constriction just below the splenic flexure due to a mesenteric band causes a decided obstruction, which can be seen by the resulting dilatation above it. Just above the iliac crest another one occurs which is not very pronounced. It is due to a contracted mesentery, and is partially obstructive when the patient is erect. Another occurs in the sigmoid at the pelvic brim. As the pelvic loop overlies the constriction it cannot be readily seen in this radiograph. It will be observed that the enema has passed into the ileum.

and attenuated to such a degree that but little can be accomplished by them when the peristalsis wave reaches this segment of the bowel. This is well illustrated and proven by the fact that a wave of peristalsis may be initiated in the cecum and carried upward to the point of resistance of the acute angle and there die out, not continuing onward to the remainder of the colon as it does under normal conditions. Intestinal contents may be forced to pass this point in small quantities each time an effort is made by the colon to carry its contents forward.

A meal containing bismuth may be administered to a patient with these obstructions. It will collect in the cecum and ascending colon at or near the normal period. It may be even forced past to a

degree so that the head of the bismuth column may appear at the normal position at any stated hour. Require the patient to continue for a longer period than to discharge the bismuth past the point suspected and it will be seen that there is a residue persisting in the proximal portion of the gut. (The



Fig. 13. Mrs. Duffy, referred by Dr. E. L. Kellogg. C. Cecum. Cn. Constriction. H. F. Hepatic flexure. S. F. Splenic flexure. T. C. Transverse colon. P. C. Peristaltic wave. D. C. Descending colon. Sg. Sigmoid. An. Angulation. It will be observed that below the constriction in the ascending colon there was pronounced dilatation. Peristalsis following the administration of the enema has occurred just below the splenic flexure. The angulation of the sigmoid is not obstructive. See No. 14.

patient may have stools regularly day after day, each of which will contain bismuth from the original meal). The contents of the colon, save for a few fragments, may be entirely cleared from the obstructed point onward at one inspection, and at the next there may be a decided increase in the distribution of bismuth from the obstruction to the rectum. This means but one thing and proves the above statement with regard to the feeding of the remainder of the colon with small portions of the contents of the cecum and ascending colon at each effort that they make to empty. This will lead a careless observer to conclude that his patient is subject to a general colonic stasis, as he finds bismuth almost constantly distributed throughout the colon.

Several of the accompanying radiographs illustrate the process by which the ascending colon

gradually feeds the remainder of the colon with accumulated material after ptosis with or without adhesions has established an acute hepatic angle. There is a tendency for the production of a second angle just beyond the hepatic flexure which is the reverse of the first one. When the patient lies down the structures below the transverse colon tend to drift upward, the greater pressure of which is near the median line and carries the middle of the transverse colon to a high position; whereas the right and sometimes left extremities of the left transverse colon, not receiving the force of this pressure, remain as they were with respect to the

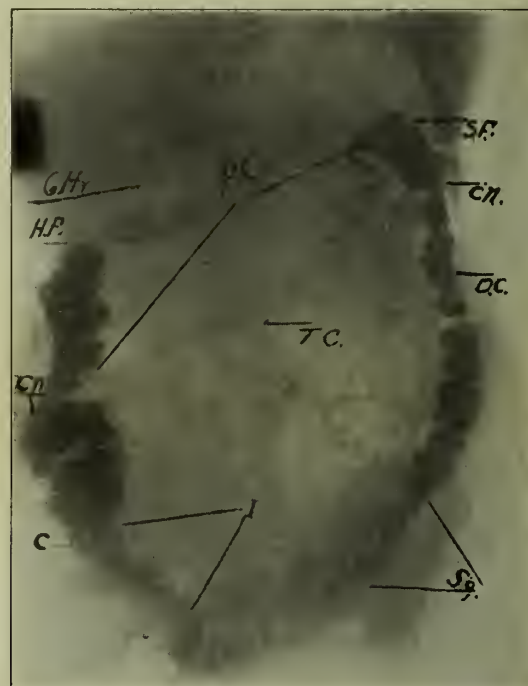


Fig. 14. Same case as Fig. 13. I. Ileum. C. Cecum. H. F. Hepatic flexure. T. C. Transverse colon. P. C. Peristaltic contraction. S. F. Splenic flexure. Cn. Constriction. D. C. Descending colon. This radiograph was taken at the sixth hour after the administration of the meal. There was a mild diarrhea existing at the time of the examination, which caused the colonic contents to advance very rapidly. Peristalsis is initiated at the static angulation in the right transverse colon. It has progressed to the splenic flexure. While the portion of the bowel just in advance of peristaltic contraction is dilated under normal condition, so that this may appear to be a normal dilatation at the beginning of the descending colon, the fluoroscopic examination and other radiographs prove the existence of the constriction in the upper portion of the descending colon. This peristaltic wave will stop at this point. Then another one will carry it forward at a later period. The angulation in the right transverse colon is not demonstrated in Fig. 13 because it has been corrected by pressure.

ascending and descending colon. This results in an acute angle forming about half way between the flexures and the median line. This is more prone to occur in an individual with iliac stasis, as the ileum is usually loaded with retained material and distended with gas. Should this condition occur we can readily see that rest, while tending

to correct some of these abnormal angles and flexures, may at the same time cause the formation of new points of obstruction neutralizing the benefit received from the favor of the horizontal position. The accompanying radiographs point out various stages and types of angles in the right transverse colon.

Angulation of the right transverse colon may be divided into six classes: First, simple angulation secondary to ptosis of the transverse colon, which has resulted in a static fixation of the hepatic angle and the first few inches of the transverse colon; this results in an angulation a little less than half way to the median line by the upward drift of the middle of the transverse colon when the subject is in the horizontal position. In this type there are no adhesions binding the two limbs of the hepatic angle. The second class is the result of membranous and cord-like bands binding the

adhesions to form and bind the transverse colon near the cecal portion of the bowel. The fourth class occurs from inflammatory adhesions secondary to gastric ulcer and carcinoma, gallbladder inflammation, duodenal ulcer and pancreatitis. The fifth class may be defined as originating from postoper-

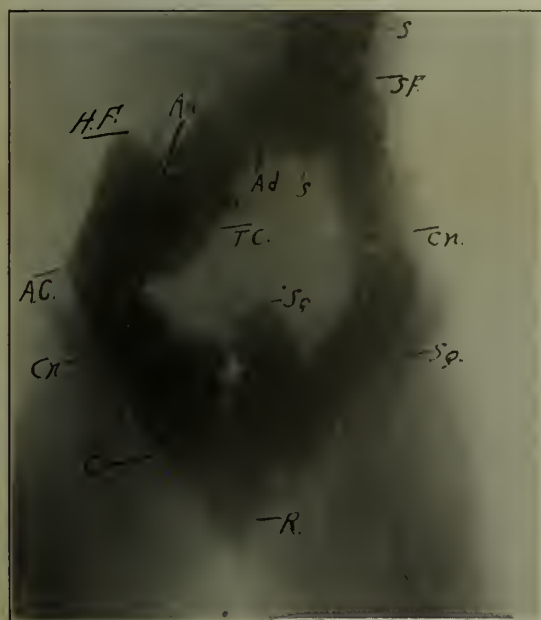


Fig. 15. Miss H., referred by Dr. W. B. Graves. C. Cecum. A. C. Ascending colon. H. F. Hepatic flexure. Cn. Constriction. An. Angulation. T. C. Transverse colon. S. Stomach. Ad. Adhesions. S. F. Splenic flexure. Sg. Sigmoid. R. Rectum. The cecum is dilated and ptosed into the pelvis. Just above it a constriction occurs. The first portion of the transverse colon has an angle that is due to adhesions between the descending and transverse colon. Adhesions bind the transverse colon just to the left of the median line, permitting the stomach to drop down over it. Another constriction occurs just above the iliac crest.

two limbs of the hepatic angle that are secondary to evolutionary processes, and low grade inflammatory exudative formations which are the sequelæ of prolonged traction at or near the hepatic angle. The third class usually results from an inflamed appendix or terminal ileum which causes

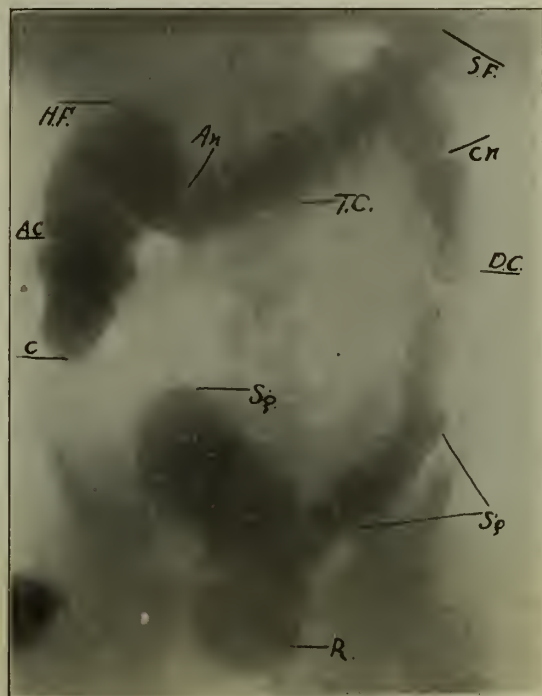


Fig. 16. Mr. C., referred by Dr. C. H. Chetwood. C. Cecum. A. C. Ascending colon. H. F. Hepatic flexure. An. Angulation. Cn. Constriction. The angulation in the right transverse colon is sufficiently obstructive to have resulted in dilatation of the cecum, ascending and first portion of the transverse colon. This could be corrected by upward pressure, but immediately returned to this position. A few small bands or adhesions on the upper border of the intestine will produce this deformity, or a band originating below the transverse colon, and passing upward over it, will result in this condition. A constriction in the descending colon was caused by a contracted mesentery.

ative adhesions. The sixth class originates from the pressure of tumors, etc.

Those cases resulting from adhesions between the ascending and transverse colon may be secondary to stasis in the cecum and ascending colon which has followed the formation of an angle from contraction of the mesentery. The third class usually presents an acute affection of the appendix or an ileac kink, either of which may produce inflammatory exudates sufficient to agglutinate the surfaces of the bowel. We may occasionally see the static type of angulation in the left transverse colon. Radiograph No. 10 illustrates this. Adhesions between the transverse and descending colon or the pressure of a large liver or tumors may establish them.

There are five points at which contracted mesentery and mesenteric bands are commonly found. In the order of frequency they are: In the upper half of the ascending colon; in the sigmoid at the pelvic brim; at the lower end of the descending colon, or just above the iliac crest; in

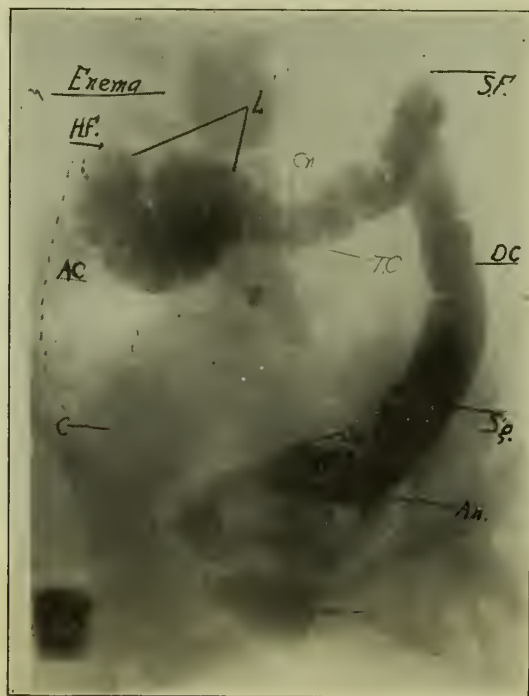


Fig. 17. Miss B., referred by Dr. Mefford Runyon. A. C. Ascending colon. H. F. Hepatic flexure. T. C. Transverse colon. The loop or angulation in the right transverse colon is due to post-operative adhesions. The case had been operated for gallstones, and had had a gastro-enterostomy. The constriction in the transverse colon is due to the same condition. The enema has not passed into the ascending colon in sufficient quantities to outline it. An acute hepatic angle accounts for the obstruction.

the first two inches of the descending colon just below the splenic flexure, and at the juncture of the cecum and ascending colon. In naming five points at which angulation of the colon occurs as the result of contracted mesentery, I am giving their most common position; there is an occasional case in which the force of the downward pull has been greater at other points; therefore we may expect to see them occasionally at almost any point in the colon.

The traction which produces the contracted mesentery just below the hepatic flexure on the ascending colon is the result of a forward and downward drag of the hepatic curve, combined with the load of the cecum and lower ascending colon. Just below the splenic flexure we have the same forces applied. The drop of the splenic

curve with the traction of the descending colon as a rule is very slight because it is the most easily drained of any section of the gut. When contracted mesentery forms at this point we are very apt to find some obstructive process in the descending colon or upper sigmoid which results in stasis in the descending colon and the overload on the splenic flexure. The transverse colon is ptosed and becomes loaded and also pulls downward to a greater or lesser degree on the splenic mesocolon.

If the pelvic portion of the sigmoid is unusually long or arches up into the abdomen, as it does when a patient with a long sigmoid lies down, an acute angle occurs just where the iliac portion of the sigmoid joins the pelvic portion; this arching and resulting strain evidently causes



Fig. 18. Mrs. H., referred by Dr. D. W. Tovey. C. Cecum. A. C. Ascending colon. H. F. Hepatic flexure. T. C. Transverse colon. D. C. Descending colon. Sg. Sigmoid. P.C. Peristaltic contraction. The peristaltic contraction has been initiated in the ascending colon, leaving a large collection in the cecum and first portion of the ascending colon. This demonstrates the cause of cecal stasis. A Jackson's membrane binds the ascending colon in this case. The sigmoid is very redundant, and bound on the left side by adhesions.

traction of the mesosigmoid, and this is a common location for mesenteric bands and contracted mesentery. (See Roentgenograph No. 21). When this acute angle is produced there is resulting stasis in the ileac sigmoid, which, if more redundant than it should be, sags forward and down-

ward with its retained material and in turn produces traction on the mesocolon. At the lower end of the descending colon, the descending mesocolon is frequently short throughout its length; this may distribute the force in such a way as to prevent this from occurring. If the stasis continues on up into the descending colon and there is enough freedom to permit its sagging downward, this pull is applied to the mesentery at or near the splenic flexure. This is most apt to occur below the splenic flexure because the two forces, one from the descending colon and another from the transverse colon, meet with greater frequency at this point. Where rectal stasis takes place which causes large accumulation in the rectum and pelvic sigmoid, the pelvic portion of the sigmoid is forced upward in the form of an arch, the upper limb of which joins the iliac sigmoid at an acute angle. This disten-

of the sequelæ of a spastic anal sphincter. This rectal and iliac sigmoid stasis is frequently seen in cases which give a history of prolonged treatments with colonic irrigations.

Occasionally we find a mesenteric band or contracted mesentery at the upper border of the cecum.

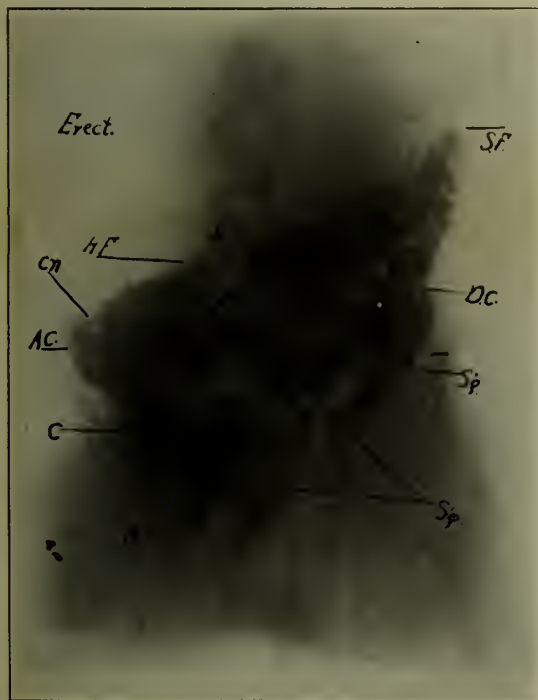


Fig. 19. Mr. R., referred by Dr. E. L. Kellogg. C. Cecum. A. C. Ascending colon. Cn. Constriction. H. F. Hepatic flexure. An. Angulation. T. C. Transverse colon. S. F. Splenic flexure. This is taken with the patient erect. This angulation in the transverse colon is due to a sagging downward of the hepatic flexure, with the transverse colon retained in a high position. The constriction on the ascending colon is the result of a contracted mesentery retracting this segment upward.

tion and arching, by accentuating this angle and pressing to the left on the lower end of the iliac sigmoid, produces a block resulting in stasis in the iliac sigmoid and descending colon, which in extreme cases can continue on upward into the remainder of the colon. By this we may see some



Fig. 20. Mr. C., referred by Dr. N. N. Stark. C. Cecum. A. C. Ascending colon. Cn. Constriction. H. F. Hepatic flexure. An. Angulation. A constriction or angulation on the ascending colon is the result of a contracted mesentery and the forward drop of the hepatic flexure. This results in angulation of the transverse colon. There is an angulation in the sigmoid at the pelvic brim.

The cecum in these cases is not always of undue length but is always dilated. It probably occurs where there is incomplete rotation of a minor degree, and the mesocecum is shorter than the ascending mesocolon, permitting the ascending colon to sag downward over the cecum and establishing undue traction on the mesentery at this point. The writer has observed this in a number of cases, several of which were operated on.

Iliac stasis is very frequently secondary to mesenteric bands or a contracted mesentery on the ascending colon; in fact, where the obstruction is pronounced, we always find iliac stasis of a greater or lesser degree. It is the result of inability of the ileum to empty its contents in a fully distended and overloaded cecum; added to this is the almost constant presence of a Lane kink in the terminal ileum, or adhesions involving the ileum and appendix.

In the accompanying radiographs many points

that are marked constrictions may be classified as angulations, but it has been the writer's practice to designate them by the term most fitted to describe them as they are seen on the radiograph when taken in the anterior-posterior position. An angulation where the apex of the angle points

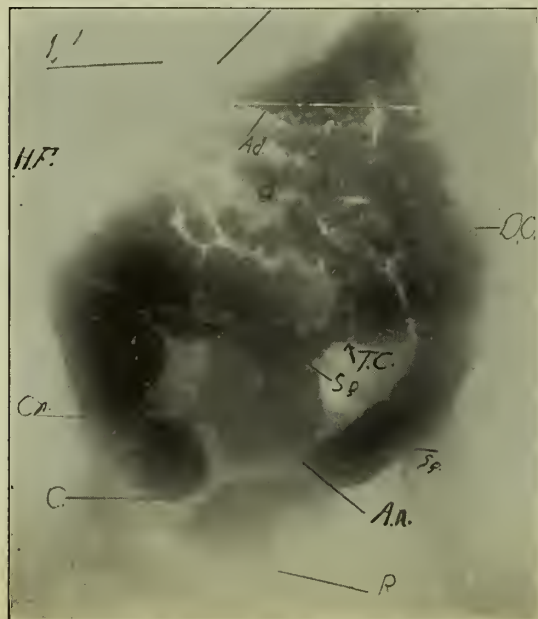


Fig. 21. Miss W., referred by Dr. E. L. Kellogg. C. Cecum. Cn. Constriction. H. F. Hepatic flexure. T. C. Transverse colon. Sg. Sigmoid. An. Angulation. R. Rectum. The constriction just above the cecum is due to mesenteric band, the hepatic flexure is pushed downward by a large liver, the angulation in the sigmoid is at the pelvic brim or the juncture of iliac and pelvic sigmoid, and is due to a contracted mesentery.

backward and we are viewing the patient from the front is only manifested by a decrease in caliber at that point or a thinning out of the shadow of the opaque salt within the intestine. This naturally presents the appearance of a constriction. If the apex of the angle points upward or downward and we view the sides of the two arms of the angle, this is made manifest by a perspective of it which leads us to designate it as an angulation. Almost all the constrictions so marked on the Roentgenographs are angulations. Some of them are constrictions in a true sense, inasmuch as a band has developed which literally squeezes the intestines almost in two; but these are practically always the locations of an angulation from a contracted mesentery, and a band is a developmental process secondary to a contracted mesentery, having at one time been a portion of the mesentery and now isolated into a separate suspending ligament, harmful because of its tendency to attach itself in

a position that contracts or constricts the intestines. As Sir Arbuthnot Lane has pointed out in his classic writings on development of evolutionary formations obstructing the intestines, these new-formed bands and angulations tend to establish themselves in the direction of the lines of force; as the slope of the supporting abdominal wall and pelvis is downward and inward, the greatest traction is applied on the outer side of the ascending and descending colon. Therefore, these so-called mesenteric bands which develop and establish abnormal supports for the intestines are found on the outer side of the colon.

Dr. J. Wallace Beveridge states that, "The accurate determination of mechanical defects existing in the intestinal tract as portrayed by the radiograph to-day is now becoming recognized as a most important factor in the routine diagnosis required in all cases wherein suspicion of intestinal trouble is aroused. The necessity of a positive knowledge

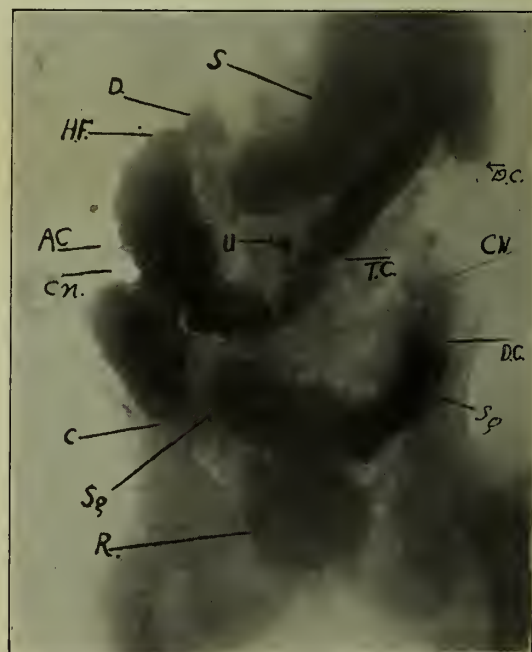


Fig. 22. Mr. De C. C. Cecum. A. C. Ascending colon. H. F. Hepatic flexure. S. Stomach. D. The first portion of the duodenum. U. Umbilicus. T. C. Transverse colon. D. C. Descending colon. Sg. Sigmoid. Cn. Constriction. In the ascending colon there is a constriction which is due to a contracted mesentery. The descending colon is deformed at Cn. by adhesions retracting it inward.

towards finding the exact location of the many lesions occurring in the intestine is made possible by the x-ray, which enables us to successfully combat many ills heretofore thought incurable."

The determination of the presence of mesenteric bands at operation is at times very difficult, as they

are usually found buried in the sulcus between the sacculations of the colon; also their common location on the outer side of the ascending and descending colon usually places them at the greatest distance from the incision. While some surgeons will make thorough search for the cause of the anomalous conditions found during the x-ray examination, others are inclined to consider such obstructive conditions as of minor importance or of not sufficient value to induce them to prolong the operation to determine their presence or dissect them out.

The practice of making small incisions eliminates the possibility of searching the entire colon. The best results the writer has observed when obtaining confirmatory evidence of the findings in these cases, has been where a very liberal incision has been made. It is very evident that if we are



Fig. 23. Mrs. M., referred by Dr. David Tovey. I. Ileum. C. Cecum. A. C. Ascending colon. H. F. Hepatic flexure. T. C. Transverse colon. Sg. Sigmoid. S. Stomach. The adhesions that are binding the transverse colon to the cecum are postoperative, and result in pronounced angulation of the colon.

to examine the ileum, the hepatic flexure, the pylorus, splenic flexure, and the pelvic sigmoid, it takes somewhat daring surgery to make as large an incision as is demanded and subject the patient to the prolonged anesthesia necessary. My practice is always to report all anomalies whatsoever that my observation has taught me are departures from

the average normal condition. The question of what is normal is often asked. We may answer that what is normal for one individual may be abnormal in another. This may be true, but the best evidence of normal conditions is no doubt obtained from, first, comparison with numerous



Fig. 24. Mrs. O'K., referred by Dr. H. Austin Cossitt. S. Stomach. N. Neoplasm. H. F. Hepatic flexure. T. C. Transverse colon. An. Angulation. The angulation of the transverse colon is secondary to the gastric carcinoma which involves the greater and lesser curvature and anterior wall of the pyloric end of the stomach.

other individuals that give no signs or symptoms of involvement of the parts suspected; second, prolonged observations of the degree of stasis in the subject under examination after having withdrawn all drugs and food which induce abnormal evacuations, placing them on a normal diet and mode of living.

Conclusions:

First. That abnormal mechanical phenomena are the prime factors that establish abnormal intestinal conditions that are now recognized as the predominant causes of intestinal stasis.

Second. At this late development of the human race, congenital abnormalities must be considered as frequently establishing obstructive conditions in the intestinal tract that are the results of our ancestry having assumed a position which precipitated mechanical defects now frequently inherited.

Third. Mechanical obstructions are established within us after birth, independent of any prenatal influence, and are precipitated by habits, food, and manifold changes in our physical welfare, such as the loss of fat and trauma.

Fourth. Intensive study by aid of the x-ray and opaque salts enables us to elicit intestinal mechanical defects and organic changes in the intestine of untold value to the internist.

Fifth. All intestinal conditions, except those demanding immediate operative interference, require a pre-operative exploration of the abdominal

contents by the aid of the x-ray and opaque salts to indicate to the surgeon the size and position of the necessary incision, and by locating the abnormalities, decrease the length of the operation and prevent overlooking important lesions.

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